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## Long-term Evaluation of a Hospital-Based Violence Intervention Program using a Regional Health Information Exchange

Teresa M Bell, PhD<sup>1</sup>, Dannielle Gilyan, MSN, RN, CEN<sup>2</sup>, Brian A Moore, MSW, LCSW<sup>2</sup>, Joel Martin, MS<sup>3</sup>, Blessing Ogbemudia, MS<sup>1</sup>, Briana E McLaughlin, MS<sup>1</sup>, Reilin Moore, MD<sup>1</sup>, Clark J Simons, MD<sup>1,2</sup>, and Ben L Zarzaur, MD, MPH<sup>1,2</sup>

<sup>1</sup>Indiana University School of Medicine, Department of Surgery, Indianapolis, IN

<sup>2</sup>Smith Level I Shock Trauma Center, Eskenazi Hospital, Indianapolis, IN

<sup>3</sup>Regenstrief Institute, Indianapolis, IN

### Abstract

**Background**—Hospital-based violence intervention programs (HVIP) aim to reduce violent-injury recidivism by providing intensive, case management services to high-risk patients who were violently injured. Although HVIP have been found effective at reducing recidivism, few studies have sought to identify how long their effects last. Additionally, prior studies have been limited by the fact that HVIP typically rely on self-report or data within their own healthcare system to identify new injuries. Our aim was to quantify the long-term recidivism rate of participants in an HVIP program using more objective and comprehensive data from a regional health information exchange (HIE).

**Methods**—The study included 328 patients enrolled in Prescription for Hope (RxH), an HVIP, between January 2009 and August 2016. We obtained RxH participants' emergency department (ED) encounter data from a regional HIE database from the date of hospital discharge to February 2017. Our primary outcome was violent-injury recidivism rate of the RxH program. We also examined reasons for ED visits that were unrelated to violent injury.

**Results**—We calculated a 4.4% recidivism rate based on 8 years of statewide data, containing 1,575 unique encounters. Over 96% of participants were matched in the state database. Of the 15 patients who recidivated, only 5 were admitted for their injury. Over half of new violence-related injuries were treated outside of the HVIP-affiliated trauma center. The most common reasons for ED visits were pain (718 encounters), followed by suspected complications or needing additional postoperative care (181 encounters). Substance abuse, unintentional injuries, and suicidal ideation were also frequent reasons for ED visits.

**Conclusion**—The low, long-term recidivism rate for RxH indicates that HVIP have enduring positive effects on the majority of participants. Our results suggest HVIP may further benefit

Corresponding Author: Teresa Bell, 702 Rotary Circle, 022, Indianapolis, IN 46202, terebell@iupui.edu, (317) 274-7435.

Conflicts of Interest: None

#### AUTHOR CONTRIBUTIONS

TMB designed the study, performed data analysis, and drafted the manuscript. DG, BAM, JM, BO, BM, RM, and CJS acquired data and made critical revisions to the manuscript. BLZ interpreted data and provided critical revisions of the manuscript.

patients by partnering with organizations that work to prevent suicide, substance use disorders, and other unintentional injuries.

**Level of Evidence**—Therapeutic study, level III.

### Keywords

Violence prevention; Hospital-based violence intervention; injury recidivism

## BACKGROUND

Although there has been a downward trend in crime over the past two decades, violence-related injuries are a growing concern for many urban areas in the U.S. The number of homicides in the 50 largest U.S. cities increased by 17% from 2014 to 2015 and nearly 1.5 million patients were treated for nonfatal assaults in 2014 at U.S. emergency departments.<sup>1</sup> In addition to human costs, such as health disparities and excess mortality, violent injury also results in high financial costs to society. The average cost of medical care for treating a patient hospitalized for violent injury has been estimated to be approximately \$25,000.<sup>2</sup> When accounting for indirect costs of injury, such as lost productivity and disability, the price is significantly greater with national estimates exceeding \$30 billion annually.<sup>2</sup> Finally, in addition to physical wounds, the effects of violent injury can result in long-term mental and physical health conditions and a decrease in quality of life.<sup>3</sup>

Hospital-based violence intervention programs (HVIP) aim to reduce both retaliatory injury and recidivism by providing intensive, case management services to high risk patients who were violently injured.<sup>4</sup> Violently injured patients often face numerous obstacles after being discharged from the hospital including: accessing follow-up care, finding safe and adequate housing, returning to work or school, addressing legal issues, and managing posttraumatic stress and community pressure to retaliate.<sup>5</sup> These obstacles can lead patients to continue to engage in behaviors that increase risk for re-injury, such as substance use, weapon carrying, or illegal activities.<sup>6</sup> Violent injury recidivism has been estimated to be as high as 44% in the 5 years subsequent to an assault resulting in hospitalization.<sup>7</sup> Young adults who are seriously injured in an assault are nearly twice as likely to have another violent injury requiring hospital treatment within two years compared to their counterparts with non-violent injuries.<sup>8</sup> HVIP operate from the premise that there is a unique window of opportunity to effectively engage with victims of violent injury while they are recovering in the hospital.<sup>4</sup> These programs often provide a broad range of services including medical, psychological, legal, and financial counseling in order to reduce criminal involvement and re-injury.<sup>5,9–12</sup>

Although published studies demonstrate that HVIP are effective, to date, few studies have been undertaken to identify which components of HVIP contribute to recidivism reduction and how long their effects last.<sup>5</sup> Additionally, prior studies have been limited by the fact that HVIP typically rely on self-report or data within their own healthcare system to identify new injuries. Our study aims to improve upon previous work by measuring recidivism over an 8 year period and identifying injuries that are treated outside the HVIP-affiliated trauma center. Using data from the one of largest regional health information exchanges in the world, our study addresses limitations of prior studies by evaluating data that contains

emergency department encounters for nearly the entire state.<sup>13,14</sup> Additionally, using this resource we are able to assess participants' recidivism since the inception of the HVIP program, Prescription for Hope (RxH), over 8 years ago.

The objective of this study was to quantify the long-term recidivism rate of participants in an HVIP program using data from a regional health exchange. We hypothesized that some HVIP participants would be treated for new violent injuries outside of the original trauma center they were initially treated at. We chose to examine this because patients in urban areas have many providers that can treat their injuries and the provider they receive care from could depend on the location they are injured, how severe the injury is, and who transports them. The results of this study can provide evidence for the effectiveness of HVIP over time and may offer insight into other medical needs violently-injured patients have after trauma center discharge.

## METHODS

### Setting

Study participants were treated at Sidney and Lois Eskenazi Hospital, which is located in Indianapolis, IN and affiliated with Indiana University School of Medicine. The Smith Level I Shock Trauma Center at Eskenazi Hospital treats approximately 1,200 patients annually and is verified as a Level I Trauma Center by the American College of Surgeons. Eskenazi Hospital is an urban, public hospital that treats adolescent and adult trauma patients. Eskenazi Health Prescription for Hope (RxH) is a hospital-based violence intervention program focused on reducing the threat of violent injury and criminal activity in the community. RxH was established in 2009 and previous studies have been published which demonstrate its effectiveness of reducing injury recidivism.<sup>15</sup> Currently, the program employs 4 violence intervention specialists, 2 social workers, a victims' advocate, and a program director. RxH provides wraparound services and sets four primary goals for participants: 1) Enroll in a health insurance plan, 2) Identify a primary care provider, 3) Obtain full-time employment or return to school, and 4) Resolve any legal issues. The program also supports housing and transportation needs for participants as well as helps them navigate individual occupational, legal, and healthcare issues.

### Study Population

Patients who enrolled in RxH between January 2009 and August 2016 were included in the study. In order to enroll in the program, patients must have been admitted to the trauma center for treatment of injuries that were inflicted by another person and resulted from assault, a firearm, or stabbing. Patients with self-inflicted injuries, injuries that resulted from domestic violence, or sexual assault were excluded. From 2009–2010 RxH enrolled patients 18 and older, however, this was changed in 2011 and now the program only enrolls patients ages 15–30.

### Follow-up Data

We obtained data on RxH participants' emergency department (ED) encounters from the Regenstrief Institute's Indiana Network for Patient Care (INPC) database. The INPC is a

large regional health information exchange with more than 17 million unique patients over 30 years with both clinical data (e.g. provider notes, labs), as well as billing data.<sup>13</sup> We extracted all ED records contained in the INPC for RxH patients from the date they were discharged from the hospital for their index injury through February 2017. Encounters were flagged as being potentially related to a new injury based on listed diagnosis codes and the specified reason for patients' visits. (Table 1) We then compiled a list of unique encounter IDs that were flagged for additional review. Using these encounter IDs, all provider notes (e.g., ED progress, admission, radiology, operative, and discharge notes) associated with that encounter were reviewed. The flagged encounters were then coded as a new violent injury, a pre-existing violent injury, not a violence-related injury, or not enough information.

## Outcome Measures

Our primary outcome of interest was long-term injury recidivism of RxH participants. Patients were considered to have recidivated if they had an ED visit for a new injury that was purposefully inflicted by another person during the follow-up period. Because ED encounters commonly use injury diagnosis codes for patients with non-acute injuries, we distinguished between old and new injuries using provider notes. ED encounters were also classified based on common reasons for visits including pain, suspected complications or need for additional postoperative care, substance use, chronic medical conditions, chronic pain, unintentional injuries, and suicidal ideation. Because each ED visit can have multiple diagnoses associated with it, categories were not mutually exclusive.

## Analysis

ED visit data was analyzed descriptively and frequencies and percentages for types of encounters are presented. Participant characteristics of those who recidivated versus those who did not were compared using chi square and t tests. All tests were two sided and alpha was set at 0.05.

## RESULTS

Between January 2009 and August 2016, The RxH program enrolled 328 patients. We were able to identify 317 patients (96.6%) in the INPC database. Of these 317 patients, 242 patients (76.3%) had ED visits. Patients had 1,575 unique encounters at 11 different EDs. Based on diagnosis codes and the patient's stated reason for visit, the most common reason for being treated at the emergency department was due to pain (718 encounters). The second most common reason was due to suspected complications or the need for additional postoperative care (181 encounters). Encounters were also commonly coded for substance use (110 encounters for alcohol abuse, 76 for tobacco use, and 24 for other types of drug use). We also identified 79 encounters related to chronic medical conditions (e.g., diabetes, hypertension, asthma, etc.), 42 for chronic pain, and 14 encounters for suicidal ideation. Encounters for accidental injuries were also common in this cohort, with 37 visits related to motor vehicle crashes and 55 related to falls. (Figure 1)

We flagged 288 encounters for additional review based on diagnosis codes and the listed reason for ED visit. There were 1,949 provider notes associated with the flagged encounters

in the INPC. There were 40 encounters with no notes available, 93 with notes that did not specify what happened to the patient, and 4 notes where we could not ascertain whether an old or new violent injury was being treated. We identified 17 encounters for new violence-related injuries, which were treated at 3 different hospitals, all belonging to different health systems. Nine of these injuries were treated at the hospital associated with the RxH program, whereas 8 were treated at other institutions. A total of 15 patients recidivated (4.4%), with two participants sustaining multiple violence-related injuries during the follow-up period. Of these 17 encounters, 5 were admitted to inpatient care and 12 were discharged from the ED. Most encounters were the result of physical assault (10), however, 6 new injuries were caused by firearms and 1 was due to stabbing. None of the encounters indicated that the patient died, however, based on an obituary search, we are aware of at least one participant who is deceased.

There were no significant differences in regards to age, gender, race/ethnicity, mechanism of injury, education level, employment at time of injury, and program goal completion between those who recidivated and those who did not. (Table 2)

## DISCUSSION

Overall our study demonstrated that the recidivism rate for RxH participants remains low compared to published U.S. data.<sup>7</sup> Our results show that over half of new violence-related injuries were treated outside of the HVIP-affiliated trauma center, indicating that relying on single-institution data to evaluate HVIP programs may be unreliable. We also found that most new injuries were relatively minor compared to the index injury and were treated and released from the emergency department.<sup>14</sup> In the first year of the RxH program, we reported a 2.9% 1-year recidivism rate.<sup>15</sup> The current study found a 4.4% recidivism rate based on 8 years of statewide data, which indicates that RxH has an enduring positive effect on the vast majority of participants.

Our study also demonstrates that violently-injured patients have a variety of medical issues that are being treated in emergency departments. Pain was the most common reason for ED visits which may indicate patients are not being discharged with adequate pain medication or that they are developing chronic pain from their injuries. It is also possible that they are either misusing pain medication or selling it as a means to provide income. Finally, our data shows that patients often receive follow-up care for their injuries in an ED setting, suggesting there is a need to improve access to outpatient care after hospital discharge. This may indicate that discharge instructions regarding wound care may be unclear or symptoms of infection are not well understood by patients and caregivers. Future studies on what prompts these types of ED encounters are needed and this information could be applied to improving the discharge planning process.

Our study shows that HVIP patients are also susceptible to other types of injuries, including overdoses, suicides, motor vehicle accidents, and falls. This suggests the need to broaden the focus beyond violence-related injuries in this population. In particular, we found that patients who attempt suicide often do so beyond the typical 1 year HVIP follow-up period.

Additionally, suicidal patients tend to have more ED encounters and present with other behavioral health issues.

### Limitations

The primary limitation of our study was that it examined the recidivism rates from participants in a single HVIP program. Our study did not include controls since previous studies, including one on our own program, have found that HVIP successfully reduce recidivism rates. Our study aim was to examine long-term recidivism outcomes of participants and identify potential gaps in how HVIP evaluate their recidivism rates as opposed to assessing the efficacy of HVIP.

### Conclusion

Based on our results and those of other studies, we conclude that HVIP, and the RxH program in particular, are effective at decreasing recidivism of violent injuries and can sustain their effects over many years. However, adequate evaluation of HVIP likely requires access to data from multiple institutions that contain detailed information on encounters in the form of provider notes. Furthermore, HVIP may benefit patients by seeking out partnerships with organizations that work to prevent suicide, substance use disorders, and other unintentional injuries.

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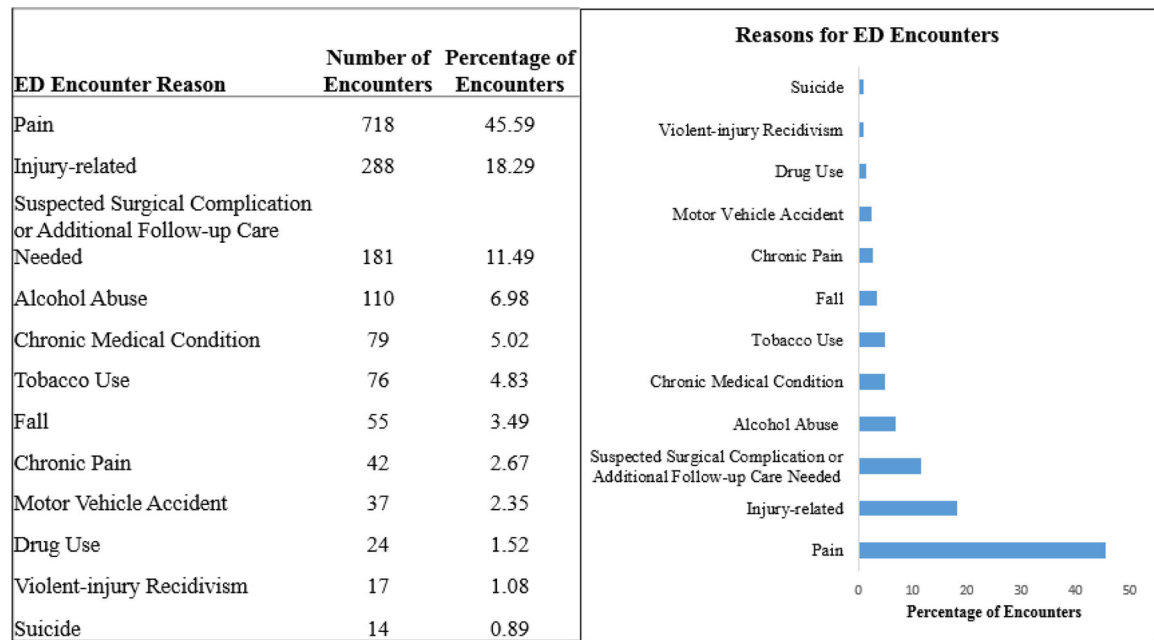
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**Figure 1. ED Encounter Types and Frequencies**

Pain was the most common reason for visiting the ED, followed by other injury-related complaints, and suspected surgical complications or additional follow-up care needed. Other co-morbid conditions were also common. “Injury-related” visits were a general category that captured conditions such as fracture, abrasions, contusions, etc. If a mechanism of injury was specified, such as a fall, then the encounter was categorized as such. Because encounters often have multiple diagnoses, these categories are not mutually exclusive. For example, a single encounter may be coded as both injury-related and alcohol abuse, if both were indicated in the ED data.



Table 1

## ED Diagnosis Codes for Flagged Encounters

379.92	Swelling or mass of eye	910	Abrasion head	S31.109D	Unspecified open wound of abdominal wall, unspecified quadrant without penetration into peritoneal cavity, subsequent encounter
719.47	Pain in Joint Involving Ankle and Foot	911	Abrasion or Friction Burn of Trunk, without Mention of Infection	S39.81XD	Other specified injuries of abdomen, subsequent encounter
723.1	Cervicalgia	913	Abrasion or Friction Burn of Elbow, Forearm, and Wrist, without Mention of Infection	S50.311A	Abrasion of right elbow, initial encounter
724.5	Backache, unspecified	916	Abrasion or Friction Burn of Hip, Thigh, Leg, and Ankle, without Mention of Infection	S50.811A	Abrasion of right forearm, initial encounter
729.5	Pain in Limb	918.1	Superficial Injury of Cornea	S50.812A	Abrasion of left forearm, initial encounter
729.81	Swelling of Limb	919	Abrasion or Friction Burn of Other, Multiple, and Unspecified Sites, without Mention of Infection	S60.031A	Contusion of right middle finger without damage to nail, initial encounter
784	Headache	920	Contusion face/scalp/nck	S60.211A	Contusion of right wrist, initial encounter
784.92	Jaw pain	921.9	Contusion of eye nos	S60.212A	Contusion of left wrist, initial encounter
786.5	Unspecified chest pain	922.1	Contusion of chest wall	S60.811A	Abrasion of right wrist, initial encounter
789.04	Abdominal pain, left lower quadrant	924.8	Multiple contusions nec	S61.212A	Laceration without foreign body of right middle finger without damage to nail, initial encounter
789.09	Abdominal pain, other specified site; multiple sites	924.9	Contusion of Unspecified Site	S61.215A	Laceration without foreign body of left ring finger without damage to nail, initial encounter
801.01	Cl base fx s inj - s loc	958.3	Posttraum wnd infec nec	S61.237A	Puncture wound without foreign body of left little finger without damage to nail, initial encounter
802	Nasal bones, closed fracture	959.01	Head injury, unspecified	S61.402A	Unspecified open wound of left hand, initial encounter
807	Closed Fracture of Rib(s), Unspecified	959.11	Other Injury of Chest Wall	S61.411A	Laceration without foreign body of right hand, initial encounter
807.01	Closed Fracture of One Rib	959.12	Other injury of abdomen	S61.501A	Unspecified open wound of right wrist, initial encounter
807.09	Closed Fracture of Multiple Ribs, Unspecified	959.19	Other injury other sites trunk	S62.232A	Other displaced fracture of base of first metacarpal bone, left hand, initial encounter for closed fracture
808.41	Fracture of ilium-closed	959.3	Other and Unspecified Injury to Elbow, Forearm, and Wrist	S70.311A	Abrasion, right thigh, initial encounter
810	Closed Fracture of Clavicle, Unspecified Part	959.4	Hand injury nos	S71.101D	Unspecified open wound, right thigh, subsequent encounter
810.03	Closed Fracture of Acromial End of Clavicle	959.7	Other and Unspecified Injury to Knee, Leg, Ankle, and Foot	S71.111A	Laceration without foreign body, right thigh, initial encounter

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813.52	Fx distal radius nec-opn	995.8	Adult maltreatment, unspecified	S72.452S	Displaced supracondylar fracture without intracondylar extension of lower end of left femur, sequela
814.01	Closed Fracture of Navicular [scaphoid] Bone of Wrist	E029.9	Other activities	S72.91XD	Unspecified fracture of right femur, subsequent encounter for closed fracture with routine healing
815	Closed Fracture of Metacarpal Bone(s), Site Unspecified	E849.6	Accident in public bldg	S80.01XA	Contusion of right knee, initial encounter
815.01	Closed Fracture of Base of Thumb [first] Metacarpal	E849.9	Accidents Occurring in Unspecified Place	S80.02XA	Contusion of left knee, initial encounter
815.02	Fx metacarp base nec-cl	E916	Struck by falling object	S80.11XA	Contusion of right lower leg, initial encounter
816	Closed Fracture of Phalanx or Phalanges of Hand, Unspecified	E917.4	Striking Against or Struck Accidentally, by Other Stationary Object without Subsequent Fall	S80.211A	Abrasion, right knee, initial encounter
816.01	Closed Fracture of Middle or Proximal Phalanx or Phalanges of Hand	E917.9	Other Accident Caused by Striking Against or Being Struck Accidentally by Objects or Persons with or without Subsequent Fall	S81.801D	Unspecified open wound, right lower leg, subsequent encounter
816.11	Fx mid/prx phal, hand-op	E918	Caught Accidentally in or Between Objects	S81.802D	Unspecified open wound, left lower leg, subsequent encounter
821.01	Fx femur shaft-closed	E920.3	Accidents Caused by Knives, Swords, and Daggers	S81.812A	Laceration without foreign body, left lower leg, initial encounter
823.2	Closed Fracture of Shaft of Tibia	E920.8	Accidents Caused by Other Specified Cutting and Piercing Instruments or Objects	S82.252D	Displaced comminuted fracture of shaft of left tibia, subsequent encounter for closed fracture with routine healing
823.92	Fx tibia w fib nos-open	E920.9	Acc-cutting instrum nos	S82.422D	Displaced transverse fracture of shaft of left fibula, subsequent encounter for closed fracture with routine healing
824	Fracture of Medial Malleolus, Closed	E922.9	Firearm accident nos	S86.912A	Strain of unspecified muscle(s) and tendon(s) at lower leg level, left leg, initial encounter
825	Fracture calcaneus-close	E928.8	Other accidents	S89.82XA	Other specified injuries of left lower leg, initial encounter
825.25	Fracture of Metatarsal Bone(s), Closed	E928.9	Unspecified accident	S92.001D	Unspecified fracture of right calcaneus, subsequent encounter for fracture with routine healing
826	Closed Fracture of One or More Phalanges of Foot	E950.0	Suicide-analgesics	S92.002A	Unspecified fracture of left calcaneus, initial encounter for closed fracture
831	Closed Dislocation of Shoulder, Unspecified Site	E960.0	Unarmed fight or brawl	S92.151A	Displaced avulsion fracture (chip fracture) of right talus, initial encounter for closed fracture
834	Closed Dislocation of Finger, Unspecified Part	E965.0	Assault by Handgun	T14.8	Other injury of unspecified body region
845	Unspecified Site of Ankle Sprain	E965.4	Assault-firearm nec	T74.11XA	Adult physical abuse, confirmed, initial encounter
850.5	Concussion with Loss of Consciousness of Unspecified Duration	E966	Assault by Cutting and Piercing Instrument	T81.4XXA	Infection following a procedure, initial encounter
850.9	Concussion nos	E967.0	Child abuse by parent	V15.51	Personal History of Traumatic Fracture

860	Traumatic Pneumothorax without Mention of Open Wound Into Thorax	E968.0	Assault-fire	V15.59	Hx injury nec
860.1	Traum pneumothorax-open	E968.2	Assault by Striking by Blunt or Thrown Object	V54.15	Aftercare healing traumat fx u
861.3	Lung injury nos-open	E968.8	Assault by Other Specified Means	V54.17	Aftercare heal traumat fx vert
872.01	Open wound of auricle	E968.9	Assault nos	V54.89	Other orthopedic aftercare
873	Open wound of scalp	E969	Late effect assault	V58.32	Encounter for Removal of Sutures
873.4	Open Wound of Face, Unspecified Site, Uncomplicated	E977	Late Effects of Injuries Due to Legal Intervention	V58.43	Aftercare follow surg injury&t
873.42	Open wound of forehead	E985.4	Undeter circ-firearm nec	V62.84	Suicidal ideation
873.44	Open Wound of Jaw, Uncomplicated	E988.9	Injury by Unspecified Means, Undetermined Whether Accidentally or Purposely Inflicted	V62.85	Homicidal ideation
873.49	Open Wound of Face, Other and Multiple Sites, Uncomplicated	M79.5	Residual foreign body in soft tissue	V71.4	Observation following other accident
873.5	Open wnd face nos-compl	O9A.212	Injury, poisoning and certain other consequences of external causes complicating pregnancy, second trimester	W20.8XXA	Other cause of strike by thrown, projected or falling object, initial encounter
873.8	Other and Unspecified Open Wound of Head without Mention of Complication	S00.12XA	Contusion of left eyelid and periocular area, initial encounter	W22.8XXA	Striking against or struck by other objects, initial encounter
874.8	Open wound of neck nec	S00.431A	Contusion of right ear, initial encounter	W29.3XXA	Contact with powered garden and outdoor hand tools and machinery, initial encounter
875	Open Wound of Chest (Wall), without Mention of Complication	S00.81XA	Abrasion of other part of head, initial encounter	W29.4XXA	Contact with nail gun, initial encounter
876	Open wound-back/s comp	S00.83XA	Contusion of other part of head, initial encounter	W34.00XA	Accidental discharge from unspecified firearms or gun, initial encounter
879.2	Open Wound of Abdominal Wall, Anterior, without Mention of Complication	S01.01XA	Laceration without foreign body of scalp, initial encounter	W34.00XD	Accidental discharge from unspecified firearms or gun, subsequent encounter
879.4	Opn wnd lateral abdomen	S01.112A	Laceration without foreign body of left eyelid and periocular area, initial encounter	W34.00XS	Accidental discharge from unspecified firearms or gun, sequela
879.8	Open wound site nos	S01.119A	Laceration without foreign body of unspecified eyelid and periocular area, initial encounter	X95.9XXD	Assault by unspecified firearm discharge, subsequent encounter
879.9	Opn wound site nos-compl	S01.81XA	Laceration without foreign body of other part of head, initial encounter	X95.9XXS	Assault by unspecified firearm discharge, sequela
881	Open Wound of Forearm, without Mention of Complication	S05.01XA	Injury of conjunctiva and corneal abrasion without foreign body, right eye, initial encounter	X99.1XXA	Assault by knife, initial encounter
882	Open Wound of Hand Except Fingers Alone, without Mention of Complication	S06.2X9A	Diffuse traumatic brain injury with loss of consciousness of unspecified duration, initial encounter	X99.8XXA	Assault by other sharp object, initial encounter
882.1	Opn wound hand-complicat	S09.8XXA	Other specified injuries of head, initial encounter	Y04.0XXA	Assault by unarmed brawl or fight, initial encounter
883	Open wnd finger/s comp	S10.91XA	Abrasion of unspecified part of neck, initial encounter	Y04.1XXA	Assault by human bite, initial encounter

890	Open wound up leg/s compl	S20.211A	Contusion of right front wall of thorax, initial encounter	Y04.8XXA	Assault by other bodily force, initial encounter
891.1	Open wnd knee/leg-compl	S20.212A	Contusion of left front wall of thorax, initial encounter	Y07.04	Female partner, perpetrator of maltreatment and neglect
892	Open Wound of Foot Except Toe(s) Alone, without Mention of Complication	S21.111D	Laceration without foreign body of right front wall of thorax without penetration into thoracic cavity, subsequent encounter	Y09	Assault by unspecified means
905.2	Late effect arm fx	S21.112D	Laceration without foreign body of left front wall of thorax without penetration into thoracic cavity, subsequent encounter	Y35.813A	Legal intervention involving manhandling, suspect injured, initial encounter
906	Lt eff opn wnd head/trmk	S21.211A	Laceration without foreign body of right back wall of thorax without penetration into thoracic cavity, initial encounter	Y83.8	Other surgical procedures as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure
906.1	Late Effect of Open Wound of Extremities without Mention of Tendon Injury	S24.109D	Unspecified injury at unspecified level of thoracic spinal cord, subsequent encounter	Z48.02	Encounter for removal of sutures
908.9	Late effect injury nos	S27.9XXD	Injury of unspecified intrathoracic organ, subsequent encounter	Z87.828	Personal history of other (healed) physical injury and trauma

ICD-9 and ICD-10 codes associated with flagged ED encounters where a potential violence-related injury was suspected. Encounters were flagged based on both diagnosis codes and the listed reason for ED visit. We flagged all ED encounters for injury, even when intent could not be determined by the diagnosis code.

**Table 2****Participant Characteristics by Recidivism Status**

	<b>Did Not Recidivate (n=313<sup>*</sup>)</b>	<b>Recidivated (n=15)</b>	<b>P Value</b>
Age, mean (SD)	27.8 (10.5)	32.5 (12.1)	0.092
Gender, n (%)			0.968
Female	38 (12.1)	2 (13.3)	
Male	274 (87.5)	13 (86.7)	
Transgender	1 (0.3)	0 (0.0)	
Race/Ethnicity, n (%)			0.775
White	58 (18.5)	4 (26.7)	
Black	243 (77.6)	11 (73.3)	
Hispanic	6 (1.9)	0 (0.0)	
Other	6 (1.9)	0 (0.0)	
Type of Injury, n (%)			0.860
Assault	45 (14.4)	3 (20.0)	
Gunshot Wound	215 (68.7)	9 (60.0)	
Stab Wound	50 (16.0)	3 (20.0)	
Education, n (%)			0.649
Less Than HS	146 (50.5)	6 (40.0)	
High School Graduate/GED	105 (36.3)	6 (40.0)	
Some College or More	38 (13.1)	3 (20.0)	
Employed at Time of Injury, n (%)			0.544
No	153 (56.0)	9 (64.3)	
Yes	120 (44.0)	5 (35.7)	
Program Goal Completion, n (%)			0.583
Incomplete	141 (46.4)	5 (33.3)	
Partial Completion	74 (24.3)	5 (33.3)	
Completion	89 (29.3)	5 (33.3)	

<sup>\*</sup> This category combines 302 patients with follow-up data that did not recidivate with 11 patients who were not in the INPC database. Patients not in the database did not have any additional healthcare encounters in any setting within the region after their initial injury.